1: Longrigg G-4, 5 (ca. 1915-1940) MH1 Iraq MH1

and progressively deteriorated. The river now adopted its Hindiya channel to an extent of nine-tenths, leaving desolation at Ḥilla, Diwaniya, and Daghara. Government organized repair works, but without adequate funds or energy, and the greater efforts made under M. Cugnin in early 1909 proved unavailing. The Euphrates irrigation position remained menacing or disastrous.

But help was, after all, at hand. The veteran irrigation engineer of Egypt, Sir William Willcocks, had studied the problems of 'Iraq water-control from 1902 onwards, and had submitted proposals to Istanbul through the British Ambassador. Late in 1908 he was appointed Consultant for 'Iraq irrigation, reached Baghdad in December and toured and studied with boundless energy, resolution, and intolerance, while the Mesopotamia Irrigation Survey pursued its work. By 1910 he had solved his problems. From the proposals in his report, most of which still held the field almost intact forty years later, there emerged the necessity for immediate large-scale works. To prevent flooding he demanded regulated flood escapes at key points, with strong embankments and the closing of existing breaches. The Euphrates escape would be at or near Ramadi, into Lake Ḥabbaniya and the Abu Dibis depression. The Tigris escape would be from the Samarrā area through miles of high ground into the Tharthar depression, unless the cost of so vast a scheme proved prohibitive. To raise low-season water-levels and provide reliable supplies to the off-taking canals, a barrage would be erected near Balad above Baghdad, and another at Kut al-Amara to restore the irrigable Gharraf (Ḥai) lands. The ancient Nahrwan canal was, by one of alternative methods, to be restored, and the waters of the Diyalā—and some of the Tigris—to be poured into it. The lower Euphrates swamps would be reclaimed by re-forming the main channels and by providing for flood escape. A barrage at Qarmat 'Ali would give controlled irrigation in Baṣra area. Large-scale drainage would be provided throughout the country by utilizing existing depressions, Tigris navigation would be safeguarded by controlling the great flood channels of the 'Amara district, the Buṭayra, Chahla, Majr Kabir, and Musharra.

Of this programme, grandiose and costly by any standards, criticism was not lacking on the grounds of deficient finances, tribal insecurity, lack of man-power, and chronic Turkish maladministration. But it was boldly adopted by the Turkish Government, with preference for the Hindiya Barrage as the first step. Willcocks witnessed from 1909 to 1911 the failure of further stop-gap attempts to repair the existing barrage, and was soon to experience his first taste of the greatest of all his problems—that of obtaining funds from the Turkish Government. Nevertheless

1: Longrigg G-4, 5 (ca. 1915-1940) MH1 Iraq MH1

312 185 653 work on the new Barrage began. Tenders for the complete construction were called for in September 1910, and the contract awarded to the British firm of Sir John Jackson & Co.

The construction of the Barrage, then and now one of the greatest works in 'Iraq, was carried out with extraordinary speed by a staff which included Turks, Indians, Armenians, and some 3,500 'Iraqis. The suspicion of certain elements in Turkish officialdom usually turned to gratified encouragement after a personal visit to Hindiya. Labour troubles were few. Transport, especially that on the Euphrates routes from Baṣra, presented extreme difficulties, with tribal blackmail and navigational obstacles: and the continual struggles needed to obtain funds from an empty Treasury in Istanbul and a harassed Daftardar in Baghdad were successful only after actual stoppage of the work seemed inevitable. The iron gates arrived in the late summer of 1913, and a crowded and triumphant ceremonial opening of the whole work was held in November of that year. Although the Barrage, which had cost less than £500,000, still lacked the canalization which it was designed to support downstream, it conferred immediately enormous benefits on the countryside which it served. These would have been a hundredfold greater if they could have included public security, an equitable land system, and some hope of new agricultural methods.

Elsewhere in 'Iraq, much of the earth-work of the Ḥabbaniya Escape in its first phase was completed, and digging of the Ṣaqlawiya Canal was begun but abandoned. Further surveys produced information of great future value, though no other major enterprise belongs to this period. A scheme for watering the Ḥawija, north-west of Kirkuk, from the Lesser Zab was begun without study and ended in fiasco and scandal. More important, and prophetic of a major development of the future, was the growing riverside use of oil engines for irrigation purposes. These increased from a mere dozen in 1900 to some scores in 1914. Meanwhile, flood-bank protection annually renewed followed its unsure and expensive course, rarely effective and always burdensome. The 'bunds' built by Nadhim Pasha for the safeguarding of Baghdad, though they failed partially in their first year, were an important work.

433 These last years of Turkish rule were marked by little industrial development. Some increase in local shipbuilding and the use of irrigation pumps, ice machines, wool and liquorice-presses called for the first time for mechanical repair facilities. The first motor-
494 car appeared in 'Iraq in 1908 from Aleppo; by 1914 less than a dozen were in use. These included a motor-bus service on the Ba'quba road, and the private cars of a few notables. Efforts to mechanize the Kufa tramway had failed.

1: Longrigg G-4, 5 (ca. 1915-1940) MH1 Iraq MH1

Government no ground even for diplomatic representations; he rebelled feebly, only to be crushed, superseded, and removed to Teheran. After an abortive uprising by the local Arab tribesmen—Cha'ab and Muḥaysin—and the usual sequence of protests and counter-protests between Baghdad and Teheran, 'Arabistan—henceforward Khuzistan—became a normal province of Persia.

Minor cross-frontier raiding was thereafter settled normally between the nearest officials of the two States. More serious trouble in the areas of Khaniqin and Qaṣr-i-Shirin late in 1925 was composed by a more formal joint meeting in March 1926. A hopeful sign of co-operation was the Persian request (conveyed, as was habitual, through the British Minister in Teheran and High Commissioner in Baghdad) for 'Iraqi help in establishing a new trade route from the Kirkuk railhead to Tabriz. It was necessitated by the Kurdish rebellion in eastern Anatolia, and would involve a mountain road by way of Ṣawj Bulaq and Rawanduz. The 'Iraq Government began its surveys and ordered bridging material from Europe. Farther south, an old disturber of the peace reappeared, Salar al-Dawla. This unbalanced but persistent royal pretender, basing new hopes on the change of dynasty, entered and crossed 'Iraq disguised in the spring of 1925, made for his old haunts in the Kirmanshah province, and sought to raise the Persian Kurdish tribesmen once again to his threadbare standard. The outlaw band of Shaykh Maḥmud was the first to join him, but they had few imitators. The High Commissioner was able by messages to dissuade all but a handful from so hopeless an enterprise, and the Air Officer Commanding flew to concert plans with the Persians at Teheran to prevent a rising. It lacked all serious support, and Salar al-Dawla retired to Syria. But in August 1926 he returned, again reached the Hawraman area, and raised some force of hungry riff-raff which looted a few villages before dispersing. No other help was forthcoming. The Prince re-entered 'Iraq in disguise, was recognized and arrested at Arbil, and was detained at Baghdad while his disposal was considered.

Towards Syria the attitude of the 'Iraqi political public was one of resentment against the French Mandatary; it led to sympathy for all Syrian nationalists and for such rebels against the régime as the Druz in 1925, but it was certainly without ideas, such as have been sometimes ascribed to King Faysal, of armed intervention. Syrian doctors and teachers were employed in 'Iraq, and Syrians were well represented on the King's personal staff. The reopening of the routes from 'Iraq, whether by Euphrates-side to Dayr al-Zur or across the Jazira from Mosul, was a desideratum which led to a series of conferences at Mosul, Dayr, al-Qa'im, and Albu Kamal between 'Iraqi and Syrian, French and British representatives from

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movements and haunted ministerial ante-rooms now thought of seeking their advantage by Government action rather than by tribal disobedience. Reports made in 1926 show satisfaction at the decrease of raiding, the willing recourse of tribesmen to the Sarays, better Government control, and fruitful use made of the Tribal Disputes Regulations—one of the most valuable legacies of the British régime.

8. DEVELOPMENT

If major irrigation works were precluded in this period by the poverty of the State, it was no less valuable that a permanent irrigation service, staffed by specialists and relying on ever-widening surveys, was watching conditions, accumulating data, constructing small works of immediate value—canal-heads, regulators, realignments—redesigning vital flood-banks, and planning the future. Without it, the stagnation and deterioration of the Turkish era must have continued, and the serious floods of 1923 and 1926, which with disastrous damage inundated outlying quarters of Baghdad itself, including a railway station and Customs warehouse, must have been yet more ruinous. Considerable canals from the mid-Euphrates left-bank above the Barrage—the Ṣaqlawiya and Yusifiya—were re-created and their lands carefully allotted. The Hindiya Barrage itself was extensively repaired and improved. The Department of Irrigation was administered by A. B. Aitken until 1921, by P. J. Sellier until 1925, and J. M. Wilson during that year, and by L. E. Bury from the Sudan from 1925–8.

In the field of agriculture, a department under an 'Iraqi director-general since 1924, J. F. Webster was Inspector-General in succession to the pioneer of Iraq cotton-growing, Roger Thomas; but here, too, far less could be attempted than the needs of the territory demanded. Land settlement could not yet be other than local, ill based, and occasional; the disastrous agrarian background was unchanged; and experiments in new crops, silk-growing, and seed varieties made at the Agricultural Institute must remain at present without effect on the prevailing practices of an agriculturally primeval peasantry. Nevertheless, a beginning was made with scientific cotton cultivation, for which high hopes were formed; the British Cotton Growing Association opened an agency and erected a modern ginnery. A large-scale general farm on mechanized lines was started by an Englishman near Mosul, but did not long survive. The Wolfra Syndicate, which hired land on the Diyalā and attempted modern farming methods, similarly could not overcome native conservatism and renounced its enterprise. The King himself owned an important estate near Khaniqin, and

1: Longrigg G-4, 5 (ca. 1915-1940) MH1 Iraq MH1

242 farmed it with improved techniques; and an 'Iraqi-Syrian group,
651 that of the 'Asfar concession', signed with Government in 1924 an ambitious land-development and irrigation agreement, involving the construction of the Ḥabbaniya reservoir, a Faluja barrage, and a dam on the Diyalā. Limited cotton-planting without notable success was carried out in 1925 by an Asfar affiliate, Diyala Cotton Plantations; but the terms of the main concession were soon afterwards called in question by popular outcry, its semi-monopolist nature was revealed, and the whole enterprise was perforce reconsidered.

242 Meanwhile, a Government anti-locust organization, on the scale which this ruinous pest demanded and using every known method, came into being in northern 'Iraq while Government participated in interstatal plans jointly established in Damascus. The deplorable harvest of 1924, the result of excessive cold and rainlessness,
654 was a reminder of the precariousness of agriculture. The small
231 Veterinary Department under Chadwick, besides its work with Army and Police horses and its civil animal hospitals, did what it could to control the endemic and epidemic diseases of the 'Iraqi flocks and herds, especially rinderpest which caused great annual losses.

653 Roads, mechanical installations, and buildings were the responsi-
494 bility of the Public Works Department, of which the Directorship was passed by J. M. Wilson, in that office since 1920, to A. S. Clay in 1925. Roads were still at this period unsurfaced and deep in mud or dust, but constant care kept them somehow open. The mileage of road and track available for wheeled transport increased threefold, and hundreds of passenger and freight-carrying cars plied on every route. The care of these, with their accompanying repair shops, supplies, and dealers formed a new branch as much
491 of industry as of travel. A trans-desert motor route, passing by Ramadi and Ruṭba to Damascus and the Levant, was inaugurated in 1923 by two New Zealanders, the Nairn brothers, whose headquarters was at Damascus. It had immediate effect on 'Iraq's foreign orientation. The service in 1926 absorbed its first (Syrian) competitor, which, using a track by Hit and Palmyra, had been the victim in 1925 of a savage attack by Dulaym tribesmen. The Ruṭba–Damascus section of the Nairn route became unusable in the summer of 1925 by reason of the Druse rebellion, and for a year thereafter convoys were diverted to 'Amman and Haifa through
205 the forbidding lava country of Transjordan. The carriage of mails by the desert motor route became usual, until air-mail services superseded it. Postal arrangements within 'Iraq, now under 'Iraqi administration with British expert advice, grew more comprehensive and included all normal post office services. Telegraphs were

1: Longrigg G-4,5 (ca.1915-1940) MH1 Iraq MH1

312 The daily lives of more Iraqis could be affected by progress in
653 agriculture than by even the greatest industry, and such progress in this period was not negligible. The grandiose irrigation schemes for which the press and public called were not, indeed, at once attainable; maintenance, minor improvement, and research were rather the order of the day. Nevertheless, some works of fair magnitude were carried out. New headworks and canalization on the Diwaniya and Daghara branches of the Euphrates were undertaken, and improvements in the water-supply to the Suq rice-lands. Swamp-drainage at Karbalā was primarily a public health measure. A permanent weir across the Diyalā replaced annually renewed antiquated works and secured supplies for the Ruz, Khurasan, and Maḥrut canals. The Laṭifiya Canal, the new Iskandariya, the Shayshubar were dug or re-aligned. A clearance of the Baṣra creeks and a major regulator, opened by the King in 1930, on the Bad'a in Muntafiq country were works of great local value. With them went continuous researches, surveys, experiments in desalination and drainage, and efforts to maintain and improve the 'bunds', breaches of which could ruin a countryside as they did in the disastrous floods of 1926 and 1929, and the necessity for which only the completion of the long-standing flood-diversion schemes could remove. Such was the Ḥabbaniya project, conceived by Willcocks twenty years earlier and closely restudied from 1927 to 1932; in the last of these years tenders were called for and the work seemed imminent. Other major plans, postponed by lack of funds and incomplete data, were the Tigris barrage at Kut al-Amara to restore the Gharraf and to control the 'Amara rice-lands: the smaller Abu Ghurayb canal from the Euphrates left bank, begun in 1932: an 'Aqar Quf drainage project near Baghdad: a proposed reservoir at or near Qizil Rubaṭ to conserve Diyalā water for summer use: a new head for the Ḥilla branch: the Isḥaqi Canal, to take Tigris water from opposite Samarrā: and work on the main Euphrates channel near Shinafiya. The Irrigation Department was administered from 1925 to 1928 by L. E. Bury, who acted also as Adviser to the Ministry of Works and after 1927 to that also of Irrigation and Agriculture. W. Allard succeeded as Director of Irrigation from 1928 to 1933, and as Chief Engineer under an 'Iraqi director in 1933–4. Wheatley resumed the advisership of Communications and Works in 1929, and held it for the next eight years.

241 Of the need to improve agricultural methods, if these canal
654 works were to yield all their value, the public was little aware. In spite of continued research and experiment, the main agricultural problems of the territory were yet unsolved—those of soil deterioration, antiquated techniques, inferior crop varieties, low and impure yields, and harvests endangered by flood or drought.

1: Longrigg G-4, 5 (ca. 1915-1940) MH1 Iraq MH1

241 473 types, and low yield depressing to the ambitious farmer. The Baṣra date industry, in which British and American packers and exporters had a dominant share, made its divisions yet more explicit in 1933 by the appearance of rival organizations within it: the Government-approved Date Growers Association on the one side, and an association of date packers on the other. The clash of interest and tactics between these two, both fully representative of their respective interests, resulted in disastrous conditions in the industry and led in 1935, after a visit to Baṣra by Yasin Pasha, to the passage of a law establishing a Date Board with representatives of all Baṣra date interests and its own direction and revenues derived from a small export tax; it effected for a time a marked improvement in growing, packing, and exporting conditions. A Committee was set up in 1933 to investigate beet-sugar production, and found reason for hopefulness. The first suggestions were heard of a monopoly for the manufacture and marketing of tobacco products, and meanwhile something was done to improve the drying, cutting, and packing of the Kurdish leaf. 'Iraqi cotton, the object of high hopes ten years before, passed through a depressed period. The crop climbed slowly to 5,000 bales by 1928, only to drop almost to nothing and to recover to 3,000 bales in 1934. Thereafter substantial yearly increases appeared, and by 1938 15,000 bales were produced. Among the cotton-growers was the Laṭifiya Company (p. 213), an enterprise which, however, found itself early in its career in serious difficulties. It failed in its undertaking to repay the cost of its canal to Government, and in 1935 control was assumed by Messrs. Andrew Weir & Co.; thereafter, with fresh finance and a revision of its agreement with Government, the progressive agricultural work of the estate could proceed. It was to remain under single and personal British management for the next twenty years. The Agricultural and Industrial Bank was unable, in its early years, to do much for the public.

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241 312 Pump irrigation, which the economic crisis of 1929–31 and the prevailing low prices involved in widespread losses and stoppages, recovered gradually after 1933 and stabilized itself as a main feature of 'Iraqi production. It had introduced, for better or worse, a new element into local agriculture—the urban capitalist; and it helped thus to lead part of the wealthier class to a fresh interest in rural affairs and modern forms of land development. In flow irrigation the period—the first in which surplus State funds became modestly available, thanks to oil royalties—was one of progress. The first stage of the forty-mile Abu Ghurayb canal, from the Euphrates left bank below Ramadi, was completed in 1936 with a considerable commanded acreage. The Mishkhab regulator, low down on the Kufa channel of the Euphrates, was built in 1936. A canal deriving

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from the Lesser Zab west of Altun Kupri and irrigating land in the Ḥawija was begun in the same year. Schemes for a Diyalā dam, and for a restoration of the ancient Ishaqi canal were studied, but the long-favoured Ḥabbaniya scheme seemed unable to come to life. It was re-formulated in 1932; tenders were invited next year but none accepted; and in 1934 the project seemed likely to be reduced to the scale of a mere flood reservoir, whereafter, for a time, no progress in the scheme was made. Its place as first favourite was taken by the Tigris barrage, to control the Gharraf river from its point of bifurcation opposite Kut. This project, which allowed by means of locks for continued Tigris navigation and for fish movement, was put to tender in 1934. Work was begun by the chosen contractors, Messrs. Balfour Beatty & Co., and by mid-1937 it approached completion—the second of the great Willcocks schemes to be realized; but the dependent canalization necessary to ensure its full value would require much further time and effort. The collapse in 1935 of the Diyalā weir, built in 1928, was a setback which called for large-scale restoration, and steps to this end were taken in 1936–7. The upkeep and improvement of existing canals continued with increasing use of ʿIraqi technical personnel, and with it further study of the abiding problems of flood protection, drainage, water economy, and silting. There was little money to spend.

6. FOREIGN AFFAIRS

Both events within ʿIraq and the external contacts natural to a modern State led during these years to greatly widened relations between Baghdad and the world outside. The process of establishing these was continuous; prestige and strategy both played their part; and no sphere of Government activity was freer from party politics. The system continued whereunder ʿIraqi representation abroad was entrusted to the diplomats and consuls of Great Britain, save only at Geneva and at the small but increasing number of capitals to which ʿIraqi Ministers were appointed. The Soviet Union alone refused to accept this system, or to recognize ʿIraq.

Italy, to which a State visit of King Fayṣal had been planned before his death, courted ʿIraqi goodwill. In spite of Sanctions, in which ʿIraq conformed to the British attitude towards the aggression against Ethiopia in 1935, Italy secured ʿIraqi armament orders in 1936 and later fêted and decorated ʿIraqi visitors to Rome (where a Legation had been opened in 1934) and subsidized in Baghdad a newspaper Fascist in tone, the *Shaʿab*. On the whole, however, Italian activity was less evident in ʿIraq than in the Levant States, and foreshadowed the assignment of that territory, with Persia, to

1: Longrigg G-4, 5 (ca. 1915-1940) MH1 Iraq MH1

to ensure Arab rights in the Holy Land, or by that of the Foreign Minister 'Ali Jawdat to Sa'udi Arabia in June.

The child-King was taken to the Lebanon for the summer, and there hailed by village enthusiasts by the roadside as 'King of Syria'. In Baghdad a new British Ambassador, Sir Basil Newton, to whom the Middle East and its problems were unfamiliar, succeeded Peterson in March 1939.

The financial needs of the State, which thanks to over-spending were now serious, were met by a grant of credits by the British Government for the pressing needs of the Railway, and equipment for the Army. Nearly £4 million was thus made available on the security of 'Iraq's oil revenues and with conditions of moderate interest and repayment spaced over seventeen years. An interest-free loan was granted at the same time by the 'Iraq Petroleum Company in return for a seven-year postponement of its export obligation under the B.O.D. Company's concession; it was payable in six half-yearly instalments of £500,000 each, and repayable at leisure out of royalties.

The Railway section from Tall Kochek to Mosul was completed, at unexpectedly high cost, and trains could now run from that city to Istanbul. The Kut barrage and Gharraf headworks were completed in March 1939: the official opening had been King Ghazi's last public act. With its fifty-six mechanically-operated gates, overall width of 1,615 feet, lock, and fish-ladder, this important work had cost £1,200,000 and, given full dependent canalization (at present lacking), was capable of the controlled irrigation of a million acres. The seven-gate Yau regulator, at the end of that branch of the Kufa channel, was erected in 1939–40, also by Messrs. Balfour Beatty. A new and improved Diyalā weir (p. 263) was undertaken in 1939 and completed by the end of 1940. Execution of the Habbaniya project, which had been revived urgently after the Euphrates floods of 1938, was entrusted in June 1939 by contract to Messrs. Balfour Beatty for £700,000 for the first phase, that of the intake canal to the lake at Ramadi and the controlled outlet from the lake to the vast Abu Dibis depression. Work on these was pressed forward. The first of the two steel bridges at Baghdad, built under contract by Messrs. Holloway Bros., was completed; it formed an imposing structure, 700 ft. long and 50 ft. wide, and, named al-Ma'mun Bridge, was opened with ceremony by the Regent. Bridge tolls were abolished throughout the country. A long-standing project drew nearer to realization when a Government bank, to be known as the Rafidain Bank, was established by law though not yet opened; its initial capital was fixed at £500,000, subscribed in part by the State. A revised version of the capital works programme was evolved by Rustum

1: Longrigg G-4, 5 (ca. 1915-1940) MH1 Iraq MH1

Politics and war-attitude apart, conditions in the territory throughout 1940 were as secure and tolerable as could be hoped. A number of offenders sentenced by the courts martial of previous régimes were liberated, the State of Emergency at al-Rashid camp, in force since March 1939, was brought to an end. Ṣubiḥ Najib was pardoned and released. The Ministry, to whom in some circles the revered Gaylani name was an asset, declared war on immorality, shut places of evil entertainment or drunkenness, and ostentatiously improved Waqf buildings. The foundation stone of the Faysal Mosque was laid. Observance of the Ramaḍan fast was enforced by the daytime closing of restaurants. The completion of the Baiji–Mosul section of the railway, with its long tunnel, permitted at last a direct Baghdad–Istanbul service, though rolling stock available for use was of the scantiest. Work at the Ḥabbaniya reservoir was pressed forward. Oil production was normal again since the month-long interruption in September 1939, and both pipelines remained in use until the stoppage of pumping, on the Tripoli branch into Vichy–French territory, in July 1940. The sowings of cotton were much increased, and 25,000 bales produced. The Government tobacco monopoly was brought into effect, to the chagrin of many Kurdish growers whose freedom of disposal it curtailed. Agriculture was everywhere encouraged with a view to full national self-sufficiency, though the disastrous spring floods were a reminder of its precariousness.

Commercial and industrial life strove to maintain normality, or even progress. An ambitious Co-operative Society to produce fruit preserves was founded. The Agricultural and Industrial Bank was busy with loans to cultivators, and with the sale and servicing of agricultural machinery; it advanced money also to a new ginnery at 'Aziziya, took shares in the 'Iraq Cement Company, and helped a vegetable-oil extraction plant. Work proceeded on the Baghdad automatic telephone installation. The budget for 1940–1, which allotted a third of all revenues to the Army, found room for the cost of completing the irrigation work on the Abu Ghurayb, and for the Ḥawija project, the Diyalā weir, the Shamiya river improvement, and the 'bunds' around Baghdad. The credit allowed by the banks and *ṣarrafs* was extended or restricted according to the war news, market prices rose and fell, Government's control in the economic field was discreet and indeed largely inoperative. Shortage of shipping and transport vehicles were a serious hindrance to the export trade, whether conveyed by sea or by the land routes. A Turkish mission visited Baṣra with the hope of securing a southern gateway of entry for their country. The loss of French purchases of 'Iraqi wool was severely felt; trade with Japan on the contrary seemed likely to develop fast.

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even the basic validity—of the oil concessions was a usual move of politicians in opposition.

In the greatest of 'Iraq's industries, that of agriculture, the war was a period of unusual activity, stimulated by the need to produce and by high prices. Agricultural machinery, thanks to lend-lease supplies, was seen almost for the first time in the northern liwās and those of Baghdad and Kut; in 1945 some scores of tractors, mechanical ploughs, cultivators, and combines were in operation, with great effect on 'Iraqi conceptions of agricultural possibilities. Projects for ambitious modern farming took shape among the educated and the owners of capital; a College of Agriculture had been founded in 1941; and a law was passed in 1944 authorizing the establishment of agricultural Co-operative Societies. But none of these measures prevented the increasing drift of countrymen in their hundreds or thousands towards the towns, where war-time employment was plentiful. In the field of land settlement, the committees, which had worked steadily and in increased numbers since 1933, were wisely kept at their all-important tasks throughout the war. Only minor attention was given as yet to southern 'Iraq, and little to Mosul, Arbil, Dulaym, Diwaniya, or Karbalā liwās; but much was done in the dispute-ridden agricultural lands of Kirkuk, Baghdad, Ḥilla, and Diyalā, where good progress was made with definition of land categories, the mapping of boundaries, and the recording of individual registrations over areas which now approached a million acres. Much was heard of plans both for model villages and for the allotment of small-holdings of Government land to single families—a sign that the evils of peasant insecurity, poverty, and lack of incentive were now fully realized. On the Dujayla Canal, dependent on the Kut barrage, work under a special law started in 1945 on a practical settlement of families on sixty-acre State-owned plots, with the incentive of free title to be gained after ten years of work; and meanwhile village institutions and amenities—school, farm offices, nurseries, dispensaries, and a co-operative store—were provided by the Directorate. The Dujayla Scheme was full of promise; it started with eighty carefully-chosen families, later to be multiplied tenfold, and it aroused keen competition for admission.

'Iraq's security after 1941 allowed its vital Irrigation services to continue their canal maintenance and flood protection, their studies and planning, though the intended major projects could not at present be initiated. The work interrupted in 1941 on the Ḥabbaniya–Abu Dibis outlet was completed by 1943, and the intake-channel from the river (begun under Willcocks) and the return-channel to it, were redesigned but not yet undertaken. Pump irrigation was fully maintained.

1: Longrigg G-4, 5 (ca. 1915-1940) MH1 Iraq MH1

Palestine—was common from 1932 until the mid-war period. It was probable that, with research and the establishment of a responsible authority not hitherto created, present production could be largely increased. Fishery development nad in 1948 found its way into ministerial programmes; a trawler for use in the Shaṭṭ al-'Arab approaches was delivered in 1950, and a fish store was projected by the Agricultural Bank.

The history of 'Iraq's irrigation from 1946 to 1950 is one of rapid approach to, or even the partial realization of, prospects long desired and, through new-found wealth, by 1951 fully practicable. The call for heroic measures was the clearer since the disastrous floods of 1946 and 1948 and the acute grain shortage—in a territory of fabulous potential output!—in the latter year; and in 1946 the resources of the highly competent Irrigation Department were supplemented *ad hoc* by the appointment of a well-staffed Irrigation Commission under F. F. Haigh of the Indian Service of Engineers. Its object was to study and report on river control and irrigation, and to submit a programme. The Commission reported in June 1949.

The task of flood control and storage was to be carried out on the Euphrates by a completed and extended Ḥabbaniya–Abu Dibis project: on the Tigris, by the grandiose Wadi Tharthar project (in two stages), by the 'Gibraltar' dam on the Diyalā at its point of passage through the Jabal Ḥamrin, and by the Dukan dam on the Lesser Zab. These works, all pronounced practicable, would save 'Iraq from floods and would greatly increase its low-season resources. They would be accompanied by the development of irrigation in new areas by canals, headworks, barrages, and feeders on the middle Euphrates, the lesser Zab, the middle Tigris (in the areas commanded by the Isḥaqi and Nahrwan canals), on the Diyalā river, and on the Gharraf and lower Tigris. Drainage was to be taken comprehensively in hand in both existing and projected irrigated areas, on lines which experiments made from 1940 to 1946 had shown to be practicable. Hydro-electric power was to be developed at the Samarrā headworks, the Wadi Tharthar outlet channel, and the Gibraltar and Dukan dams. Plans for the reclamation of the southern 'Iraqi swamps, and the re-formation of the lower Tigris, were suggested but not formulated. Of this gigantic programme, expected to cost some ID 90 million, about a quarter of the whole was to be undertaken immediately and finished within ten years: it would include the first part of the extended Ḥabbaniya and of the Wadi Tharthar schemes, the Gibraltar dam, drainage work, and the extension of existing irrigation in the Nahrwan and Gharraf areas and on the Euphrates. A large part of these plans was adopted by the Development

1: Longrigg G-4, 5 (ca. 1915-1940) MH1 Iraq MH1

Board[1] at its early meetings in 1951 and they were, with possible modifications, to form the basis of 'Iraq's future irrigation activity, whose full realization, however, must, for all the impatience of the public and the press, occupy not less than fifty years.

Works actually completed before the end of 1951 were the realigned Ḥabbaniya inlet (Warrar channel) and the return outlet to the river (Sinn al-Dhibban channel), ensuring flood protection and making possible the use of stored flood water. The Wadi Tharthar inlet channel—a work of very great magnitude—was put to tender by the Development Board in 1951; the Samarrā barrage and headworks, and the greater Ḥabbaniya scheme, were to follow later. Much detailed planning and designing remained to be done, even for the immediately following five years, before a programme, especially in lower 'Iraq—'Amara, Baṣra, and the Gharraf—could be established. The extent, however, to which the Willcocks plans of forty years earlier had stood all tests was indeed remarkable. Only the Faluja and Balad barrages (p. 63) had been abandoned, and development in the Baṣra–Ḥammar area might or might not in the end follow Willcocks's plans. The abiding problem of silt deposit appeared partly soluble, by improved headwork design and by mechanical clearance. Pump irrigation seemed by now to have reached its economic limit in much of the territory, but there was ample room for more intensive cultivation of the pump-lands.

The connexion of reasonable and stable forms of land tenure had long been recognized by Government in its land-settlement activity, and the latter had a creditable volume of achievement to show after eighteen years of sustained effort. Early criticism of the procedures adopted (p. 261) and the progress of the work itself throughout 'Iraq (p. 323) have been elsewhere described. Five more years' work since the end of the war had defined, delimited, and recorded the personal rights in other wide areas. The abiding problem of Muntafiq land rights had not yet been solved; in 'Amara an answer not very different from the *status quo*, but with longer-term security for the shaykhs and greater fragmentation was likely to be found. Elsewhere the hard case of the landless fallaḥ was little changed wherever he had been unable to establish a basis of title and, at the opposite extreme, the good fortune of

[1] The Board's six-year plan, legalized early in 1952, provided for year-by-year expenditure, from 1951–6 inclusive, on the Tharthar project, to a total of (in thousands of ID) 10,300: on the Ḥabbaniya, 2,200: on the Diyālā dams and canalization, 6,750: on the Dukan dam, Ḥawija barrage, 'Udhaym barrage and canalization, 6,750: on the Bakhma dam, 8,700: on irrigation works in Mosul and Arbil liwās, 1,900: Tigris barrage and canalization, south of 'Udhaym mouth, 1,800: and main drainage, 4,100. New and re-formed canalization on the middle and lower Euphrates, lower Tigris and Gharraf, and Baṣra area were allotted 10,425.

3: Clark S-5 (1950)1951 MH1 Iraq MH1

If developments of this kind proceed it is likely that the agricultural productivity of Iraq will increase considerably. Although most of the profits will find their way into the pockets of a few, more taxable wealth is likely to be produced which could wisely be devoted to the development of educational and other social services. Indeed, if means could be devised of applying income tax to such profits, considerable additional revenues for public services would accrue.

The Dujaila Project of Land Settlement. But perhaps the most hopeful and significant economic and social development which is taking place in Iraq is the Dujaila Project of Land Settlement.

Some years ago, as one of the first attempts at land reform, the Government distributed parcels of land to small, independent farmers. The Government provided the irrigation facilities and, on the land which could consequently be brought under cultivation, allowed families to settle. The scheme was not nearly so successful as it should have been, partly because some of the tenants lacked sufficient farming experience but mainly because it was not accompanied by a scheme for providing agricultural advice. Further, because of the failure to institute adequate drainage arrangements, there is a danger that much of the land in the settlement area will lose its fertility through otherwise avoidable salinity.

In the Dujaila area, in the province of Kut, the Government are now in process of organizing a much more satisfactory and intelligently conceived scheme of land settlement. In 1945 a large tract of hitherto uncultivated land, roughly seventy kilometres long and about half that distance wide, was selected as an area for land settlement. The scheme is being organized by a department known as the Dujaila Directorate to which a reasonable delegation of powers has been given. Its main features may be summarized as follows:

(1) Each settler, who must have had previous agricultural experience in or near the locality, is provided with a holding of about sixty acres. The settler has to sign a well-devised form of contract which binds him for a period of ten years to farm his holding in accordance with advice given by the agriculturalists and horticulturalists attached to the Directorate. At the end of ten years the holding is apparently vested in the holder in a form of limited freehold.

(2) Each settler is eligible to apply for an initial grant not exceeding £100 for the purchase of equipment, assistance towards the building of his house and farm buildings.

(3) Each settler must plant sufficient trees around his holding,

Air Force. The terrain was exceedingly mountainous and thickly wooded and there were many caves in which to shelter from bombs or machine-gunning from the air. The Shaikh's followers, too, were very hardy and mobile. Without very efficient air action, which aimed at destroying the morale of the Kurds by perpetually harassing them rather than by slaying them, to gain a definite result would have been a very costly affair. As it was the Shaikh and his followers were eventually driven into Turkey and after surrendering to the Turkish authorities were handed over to the 'Iraq Government. It was found that the Shaikh, his brothers and the remnants of the standing army could not fit in with any regular administration, and so they have been settled in small bodies in southern Kurdistan near Sulimani, where they will not be in a position to cause further trouble. The Barzanis have now reverted to the Islamic faith.

Roads

What has really tamed the Kurds is the Government policy of making roads through the mountains, just as General Wade did in Scotland with similar results. Good roads now exist from Arbil, where Alexander the Great defeated King Darius III. in 331 B.C., to the Persian frontier at Rayat and from Dohuq to Amadia. Both these roads represent considerable engineering feats and carry a good volume of traffic. The Rowanduz road was that which a nomadic Kurdish tribe, the Herki, with their 60,000 animals, used on their annual migrations from 'Iraq to their summer grazing grounds in Iran. During recent years difficulties arose between the nomads and the 'Irani Government, and the former now remain in 'Iraq for the summer. It has not been easy to find grazing for them there, as other nomadic tribes had already been forbidden by the Turkish Government to graze in Turkey and had occupied practically all the spare grazing. The 'Iraq Government, too, has been attempting to popularize summer resorts in Kurdistan and so prevent the flow of money to Syria and the Lebanon, where good summer amenities exist. I am afraid, however, that so far this policy has not been very successful. Good summer resorts require the expenditure of much money, and the attempts at providing suitable summer accommodation have, I regret, tended to spoil what was originally beautiful scenery.

The little town of Zakho in western Kurdistan has greatly benefited by the improvement in public security and communications and is

4: Wilson G-3 (no date) 1937 MH1 Iraq MH1
Kurd MA11

I K 438 439 173 782 539

now a flourishing market for the surrounding country and for trade with Turkey. It has one feature of great interest: an ancient bridge of Roman design, known locally as "Alexander's bridge," though unlikely to be in any way connected with the great conqueror. Tradition at Zakho has, however, another tale of the construction of the bridge. It is said to have been built by a celebrated local governor, who found that the keystone would not remain in place. He summoned a soothsayer, who proclaimed that it would never stand until a life had been built into the arch. The governor accepted the verdict and with his councillors, who were sworn to secrecy, decided that the first living thing to follow them on to the bridge the next morning would provide the necessary victim. They waited for some hours, but no one came. Then the governor's little daughter wondered why her father was so long away and taking her pet dog she set off to look for him. Her father was at first terrified when he saw her coming, but was relieved when he noticed that her dog was running in front of her. Alas, she thought it unfitting for the dog to approach her father before she did and so she called it and stepped on to the bridge. Public opinion compelled the governor to carry out the sacrifice and the girl was built into the centre of the arch and the keystone held and has gone on holding for hundreds of years.

I K 653 185

The development of Kurdistan has naturally not been popular with all the Kurds, and I remember an interesting incident. During the construction of the Amadia road, an elderly Agha stood for a while sadly watching the blasting of a pulpit of overhanging rock. When echoes of the explosion had died and the last fragments of stone had fallen into the rocky gorge below, he turned sorrowfully away. "The old days, the old days," he lamented. "Many is the time I lay behind that rock with my rifle and held up caravans for safe-conduct money."

I K 721 361

The town of Amadia, which, like Edinburgh Castle, is situated on a rocky plateau at a height of 4,100 feet, sixteen feet higher than Cairn Gorm, is now easily accessible by road. The town was formerly ruled by semi-independent Pashas who admitted a nominal suzerainty to the Turkish authorities. It has a stormy history, and the minaret of the mosque is pitted with bullet holes. These are souvenirs of 1925, when the Barzan Kurds, in alliance with some of the descendants of the old rulers of Amadia, attacked the town and succeeded in surrounding the Mosuli qaimaqam and a handful of police in the Government serai. The stout-hearted garrison held out until they were rescued by a body of Assyrians under the Assyrian bishop, Mar Sergis, a jovial Friar Tuck of the Nestorian Church.

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4g Wilson G-3 (no date) 1937 MH1 Iraq MH1

DISCUSSION

Mrs. SOANE-ELLIS: Might I ask if the lecturer has any information as to the whereabouts of Sheikh Mahmud? The last time I saw him he was a prisoner at Ramadi. 000

Major WILSON: I cannot say whether he is exactly a prisoner now, but he certainly would not be allowed to go back to Sulaimaniyyeh.

Brigadier J. G. BROWNE: May I ask what is the position of the Pizhder Kurds under the present Government? 657 563

Major WILSON: There has been a slight extension of police control, but, as far as I know, real administration has not yet been established over the Pizhder.

The CHAIRMAN: It remains, I think, only for me to sum up what we have learnt. We see here again the extraordinary importance of the question of roads in establishing the authority of the Government among mountain peoples. We are building roads on the North-West Frontier of India. And here we have seen the roads that are being built through Kurdistan, like Mr. Hamilton's very fine achievement, the making of the road through the Rowanduz Gorge. I believe the account of the building of that road is going to be published shortly, and it should make a book well worth reading. 653 657

We have seen some extraordinarily interesting slides. And we have learnt some valuable information about the present position of the Assyrians. From what the lecturer says, the best plan now would appear to be rather to leave them alone where they are. The other plan was to have been to move them to an extremely suitable site on the Orontes River. But unfortunately the lands chosen had been sequestrated from their original owner, who had been in trouble. When M. Blum came into office, he decided he could deal with this case, reinstated the man in question, and restored his lands. So that scheme necessarily came to nothing, and it is quite impossible on other grounds now for the Assyrians to go there. But one gathers that it is wisest not to agitate on their behalf, nor to stir them up, for that only makes them very unpopular in the country. They are finding employment to some extent in the oil-fields, and as guards and station masters on the railways and in similar employment, and one can hope things may settle down and that they will stay in their own country. 186 463

We must thank our lecturer, not only for the good work he has obviously done in 'Iraq, but also for the excellent and informative lecture he has given us this evening. 000

6:Ireland S-5 (no date)1937 MHI Iraq MHI

643 new Chamber which would not only ratify the new Treaty of
666 1930 without raising difficulties, but which would also contain Cabinet material on which he could ring Ministerial changes as he thought necessary, made his personal approval obligatory before candidates received government support.

643 In the conduct of general administration, however, the intervention of the King was as a rule well directed and in the
● [653] interests of the country as a whole. To him has been ascribed the initiation of the Capital Development Works scheme,[1] whereby revenue from oil-concessions was earmarked for definite projects to facilitate the development of the country.[2]
[166] To him has been given the credit for the plans to settle the tribes on the land, and the development of residential amenities about Baghdad. In administrative appointments, his early inclination to find employment for those who had served him in western Arabia was never entirely overcome, but in general, as a result of his influence, more suitable appointments were made and without regard for religious distinctions. His broad outlook and his consideration for each community in proportion to its contribution to the welfare of 'Iraq enabled him to take a wider view of affairs than many of his Ministers and the majority of his subjects. It is a fact that although 'Iraqis universally proclaimed their familiarity with democratic institutions from the time of the Ottoman regime, and boldly asserted their competence to run them, conditions in 'Iraq were
[565] far from ideal for the introduction of such institutions. No adequate class existed from which responsible and public-spirited officials could be drawn, nor was there a substantial body of literate and informed citizens with which to work the democratic institutions as provided in the Constitution.

An even greater obstacle was the lack of social consciousness

[1] By the Prime Minister, Nūrī Pasha, in a speech to the Chamber, May 31st, 1931.

[2] Cf. publication by the Department of Public Works, 'Iraq: *Budget Estimates for the Years* 1930 *and* 1931 *and Capital Development Works Budget for* 5 *Years* 1931-35.

7: International Bank N, S-4 (1951) 1952 MH1 Iraq MH1

311 a means of establishing a class of independent peasant landowners capable of earning a decent livelihood. Official estimates indicate that the amount of "cultivable" land is almost three times that under cultivation. The criteria used in determining the cultivability of land have, however, probably varied widely. Thus part of the cultivable land in the so-called rain-fed zone in the north may well be in areas sub-marginal from the standpoint of rainfall. As soon as possible the government should classify the cultivable land which is not presently cultivated by types of soil and determine what measures are required in each instance to put the land under cultivation, e.g. whether the land must be reclaimed by drainage and whether, if the land needs to be irrigated, the irrigation should be by pump or by flow.

Most of the area which can be put under cultivation will require water, yet, under current conditions, the supply of water does not even permit the effective irrigation of the area already in use. Projects for the storage of the excess water which pours down the Tigris and Euphrates rivers during the spring flood season and 653 frequently unloosens destructive floods are clearly essential. The 312 government has already initiated work on the Habbaniya Lake storage scheme for the Euphrates River and has let a contract for the first stage of the Wadi Tharthar flood control project on the Tigris River. The program of the Development Board also makes provision for storage dams on two tributaries of the Tigris, the Lesser Zab and the Diyala River. While the Derbend-i-Khan dam on the Diyala River will provide primarily for the more effective irrigation of land already under cultivation, completion of the Dokan dam on the Lesser Zab and of the Habbaniya Lake project should provide enough water to extend the cultivable area under irrigation from about 11 million donums at present to approximately 15 million.

The Mission fully endorses these projects (see map), with the proviso that borings prove the soundness of the Dokan dam site. At the same time it recommends that they be complemented by the construction at an early date of the Bekhme dam on the Greater Zab River for which no provision has yet been made. This dam would compensate for the diversion of the Lesser Zab water from the Tigris by the Dokan dam. Without the Bekhme dam the

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already existing water shortage in the Kut and Amara regions in southern Iraq would become more acute. Its construction is all the more urgent because the Wadi Tharthar reservoir will not supply supplementary water for the Tigris for another decade at best. In fact, some geologists believe that loss of water in the reservoir may be such that little or no water for irrigation will ever be furnished by the Wadi Tharthar. Should the Wadi Tharthar ultimately prove able to supply water for irrigation, the water impounded by the Bekhme dam could be utilized for the irrigation of the Erbil plain in northern Iraq.

Completion of the final stage of the Habbaniya project calls for the storage in the Abu Dibis and related depressions of water in excess of the expanded capacity of Habbaniya Lake and, in theory, would also permit a substantial extension of irrigation in the Euphrates Valley. Further study is required before beginning this stage of that project, however, because there is great danger that the salt in the depression may make the water unfit for irrigation, or at least dangerous to use, until after the completion of drainage facilities for all the areas irrigated from the Euphrates. At the same time the technical possibility of providing alternative storage capacity through the erection of a dam on the upper Euphrates near Ana should be explored.

The irrigation projects outlined above necessitate agreements with Syria, Turkey and Iran regarding the conservation and utilization of the water of the Euphrates and the Tigris and their tributaries. An agreement with Syria is particularly urgent, since the extensive irrigation development possible in that country might adversely affect Iraq. With Turkey and Iran it is important to conclude understandings for joint afforestation and other water conservation measures in the watershed of the Tigris and its tributaries. Afforestation and other anti-erosion measures in the international watersheds of the two rivers will effectively complement the flood-control features of the water storage schemes.

In the monograph on irrigation the Mission has given a tentative selection of the irrigation projects which it believes should be initiated to utilize the waters of the new reservoirs. In view of the inadequacy of the information at its disposal, the Mission suggests, however, that its recommendations be reviewed in the light of a

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312 late to benefit winter crops and too early for summer crops.
133 Destructive spring floods are apt to occur just before the harvest-
[731] ing of the winter crops begins and as the planting of summer crops is in process. In the dry season—July to December—which is critical for both summer and winter crops, the mean discharge of the Euphrates at Hit and the Tigris at Baghdad is only 421 cumecs (cubic meters per second) and 559 cumecs, respectively, as compared with 1,765 cumecs and 2,572 cumecs during the three peak months of the spring.[2] The Haigh Commission has calculated that the mean discharge which can be relied upon for irrigation is only 280 cumecs for the Euphrates and 350 cumecs for the Tigris and its tributaries. This supply would appear to be barely equal to the water needed for existing irrigation systems when figured on the basis of the standards usually applied in Iraq. In fact, at present there is an acute shortage of water in the irrigated areas of the Diyala Valley and the Hilla canal system while in other areas water is wasted. Short of radical economies in the use of water, which can only be realized over the long term, no significant extension of the irrigated area can be undertaken without controlling and regulating the flow of the rivers. Nor can disastrous floods be controlled without schemes for the storage of the excess waters.

The Euphrates

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312 A project for the regulated diversion of the flood waters of the Euphrates into Lake Habbaniya is already under way. This project involves the construction of an inlet channel from the Euphrates near Ramadi to the lake as well as an outlet channel for the later release of the stored waters. A barrage will be built across the Euphrates at Warrar to raise the water level and thus permit an increase in the capacity of the lake reservoir. The outlet channel and regulator are already finished and work is well advanced on the inlet channel and its regulator. The project when completed will reduce the flood discharge from a possible maximum of 5,200 cumecs to 2,000 cumecs and will increase the minimum supply of water available for irrigation from 280 cumecs to perhaps 440 cumecs. The total cost is estimated at ID 4,300,000.

[2] See chart and also Tables I and II in the appendix.

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While the soundness of the scheme is beyond question, the Mission has serious reservations about extending the storage capacity of the project by evacuating part of the water in Lake Habbaniya to the nearby depressions of Bahr el Milh and Abu Dibis through the discharge channel of Mujarrah. The Haigh Commission contemplated that with the reservoir formed by these depressions the maximum flood discharge could be further reduced to 1,500 cumecs and the water available for irrigation could be raised to 510 cumecs. In the opinion of the Mission, however, the salt in these depressions would be a serious obstacle to their use as a reservoir for irrigation water. The use of the stored water of Lake Habbaniya would in itself tend to raise the salt content of the Euphrates to the maximum concentration considered usable for irrigation. Since the lake is said to contain about two million tons of salt, and the waters of the Euphrates entering the lake themselves contain some salt, the waters of the lake at the capacity set by the 49.5 meters contour may reach a salt content of 100 parts per 100,000. These waters when mixed half and half with those of the Euphrates, which have a maximum salinity of 40 parts per 100,000, will tend to have a salt concentration of 70 per 100,000 or approximately the maximum tolerance. The Bahr el Milh and Abu Dibis depressions, however, now contain about 44 million tons of salt. The 20.5 billion cubic meters of water which might be stored in these depressions would therefore have a salinity of 215 parts per 100,000. It would be necessary to remove 27 million tons of salt in order to reduce salinity to 80 parts per 100,000. The Haigh Commission thought it possible to achieve this lower salt content in approximately four years by progressively evacuating the stored water into the Euphrates, but at a rate which would not raise the salt in the Euphrates itself over 80 parts in 100,000. Even granting this possibility, the Mission believes, however, that the resulting salt content would still be too high for irrigation water.

As a minimum, the Mission strongly suggests that any project for storing water in these two depressions be deferred until the problem of salting, already acute, has been brought under control by the installation of drainage facilities in the irrigated areas of the Euphrates Valley. At the same time it would be advisable to explore the possibility of alternative storage capacity somewhere

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along the Euphrates. Of several possible sites, the best appears to be at Rawa, a few kilometers upstream from Ana. There a dam 35 to 40 meters in height could be erected to create a reservoir with a capacity of seven billion cubic meters and an area of 480 square kilometers. The water would be backed up over a distance of 200 kilometers of which 60 kilometers would be in Syria. No geologic study of this possible dam emplacement has been made. An examination of outcroppings shows a series of horizontal layers in which soft but fairly compact limestone alternates with layers of highly decomposed rock and layers of soluble gypsum. While these surface indications raise serious doubt concerning the water-tightness of the possible reservoir, the Mission urges that a geologic study of the site, supported by soundings, be carried out in order to obtain a geologic cross-section in the neighborhood of the projected dam emplacement.

The Tigris

Flood control on the Tigris is to be assured by the Wadi Tharthar project. A contract for the work on part of this scheme was awarded in the fall of 1951. The project involves the erection of a barrage across the Tigris, north of Samarra, to limit the flood discharge of the river to about 3,500 cumecs and divert the excess waters via an inlet channel into the Wadi Tharthar depression. At a contour of 60 meters the depression is expected to hold about 68 billion cubic meters of water in a reservoir extending over 2,050 square kilometers. The total cost of this project, for which the International Bank for Reconstruction and Development provided a loan of $12,800,000 in June 1950, has been budgeted by the Development Board at a figure of ID 9,625,000.

The efficacy of the Wadi Tharthar as a flood control scheme is clear. That the depression is sufficiently watertight to store enough water for irrigation is less certain. The Haigh Commission and its geologist had no doubt on this score, but other experts, including the one who served as government geologist until recently, have raised serious questions regarding the tightness of the reservoir. Two firms of consulting engineers—Messrs. Coode, Vaughan-Lee, Frank and Gwyther, and Sir William Halcrows and Partners—have advised that the Wadi Tharthar project be considered exclusively for flood control. In any event, it would take about ten years

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for the reservoir to fill to the level at which water might be supplied for irrigation, and this water would then be available only for use in the Tigris Valley from Baghdad south. Thus other schemes for the storage of water for irrigation have to be considered.

From time to time storage dams for the Upper Tigris have been suggested, some with the obvious hope that they would cater to the needs of the North where rainfall is unreliable and does not permit the cultivation of summer crops. Among the sites proposed are two north of Mosul. One is near the village of Zumar about 115 kilometers from Mosul. The topographic features there would permit the creation of a storage basin, but geologic conditions appear to be very unfavorable. The soil consists of badly decomposed and fissured Lower Fars limestone and of marl which is also more or less decomposed. While no geologic investigation of the site has been made, borings made by the Mosul Petroleum Company about 10 kilometers away indicate the presence of numerous permeable layers in this area through which large amounts of water would probably be lost. Despite these prima facie doubts about the water tightness of the reservoir, the Mission believes that a complete geologic study, including borings, should be made of the site because of the understandable interest in this project in the North.

Conditions at the second site—Badosh, 25 kilometers above Mosul—are even less favorable. It has been suggested that with a dam 45 to 50 meters high a reservoir with a capacity of five billion cubic meters could be constituted. Outcroppings, however, disclose decomposed limestone with many caverns on this site. The dam would have to be built across a slight fold, cutting through various formations. Even with resort to costly and laborious injections of concrete, it is extremely doubtful that the proposed reservoir could be waterproofed.

Farther down the Tigris there is another possible dam site at Fatha where the river crosses a mountainous fold running northwest-southeast and known as Jebel Hamrin on the left bank and Jebel Mahul on the right bank. This site was studied in some detail by consulting engineers in 1940, and the investigation was resumed by the Haigh Commission in 1948. The Commission's geologist held that it would be impossible to build a gravity dam

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in the gorge itself but that an earthen dam farther upstream might be feasible. The dam would have to be about 3,500 meters long and, with a height of 75 meters and a fall board of six meters, could be used to store 24 billion cubic meters of water up to a contour of 182 meters. It could therefore be considered as an alternative to Wadi Tharthar and even as preferable since it would be likely to make more water available for irrigation. However, the anticipated cost of construction—about ID 20,000,000—and the vulnerability of an earthen dam to enemy attacks in time of war caused it to be rejected. Now that there no longer is any question of its consideration as an alternative to Wadi Tharthar, the possibility of a more modest project at Fatha might well be examined. A dam only 40 meters high could create a reservoir of five billion cubic meters which might some time in the future become of critical importance to irrigation. At the same time it would be so much smaller than the original project that the same objections concerning its safety could hardly be entertained. The Mission would therefore recommend further geologic studies and, particularly, a series of borings to determine definitely a geologic cross-section along the axis of the site.

The Tigris Tributaries

The Development Board has already provided in its five-year program for the construction of the Derbend-i-Khan dam on the Diyala river and the Dokan dam on the Lesser Zab river. The Mission agrees that these dam sites are the best available but suggests, as will be indicated in greater detail later, that these two projects be supplemented by the construction of the Bekhme dam on the Greater Zab river.

The Derbend-i-Khan Dam on the Diyala

Originally the Haigh Commission recommended that a dam be built at a point called Gibraltar where the Jebel Hamrin crosses the river. In 1950, however, Messrs. Coode, Vaughan-Lee, Frank and Gwyther and Sir William Halcrows and Partners expressed their preference for a dam at the Derbend-i-Khan defile farther upstream; and in 1951 the Development Board included this project at a total cost of ID 4,800,000 in its five-year program. The Mission considers this decision sound. The foundation soil at the

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Gibraltar site is soft sandstone sandwiched with layers of impermeable marl. The dam would have to be built of locally available sand and gravel, with an impervious facing in reinforced concrete or an impervious core; and it would be difficult to establish a watertight joint between the impervious facing and the impervious soil through the sandstone. The hills edging the reservoir show many low points where lines of seepage are so short as to create the risk of breaches. The presence of a lot of gypsum adds to the doubt about the watertightness of the reservoir. Moreover, its size and location are such that 128,000 masharas[3] of arable land would be submerged and 35 kilometers of railway detoured.

Borings have been made at the Derbend-i-Khan site and expert geologic opinion holds that the site provides a good foundation for a dam and has possibilities for a watertight reservoir. The rock-fill dam to be built will only close the breach, opened by centuries of erosion, in a solid rock sheath which, over long geologic periods, must have constituted the resistant part of a natural dam. The capacity of the dam will be only 0.87 billion cubic meters as compared with 1.56 billion for the Gibraltar dam. However, after allowing for losses, engineers believe that Derbend-i-Khan will provide a discharge of 80 cumecs at the Diyala weir, which governs the Diyala irrigation canals, as agaist 85 cumecs for Gibraltar. At present the usable mean discharge at the weir is only 38 cumecs.

The Dokan Dam on the Lesser Zab

A short distance from the Iranian border the Lesser Zab River passes through four gorges. According to competent geologic opinion, only the fourth of these, namely the Dokan Gorge, appears to offer a suitable dam site. The Dokan Gorge cuts through about 60 meters of Judean limestone covered by 40 meters of Shiranish limestone. Surface examination indicates that the former apparently consists of horizontal, generally sound beds, interspersed here and there, however, by caverns, while the Shiranish appears to be much more fissured. Up to the present only a brief geologic reconnaissance of the site has been carried out. Borings should be undertaken to confirm the surface indications and determine what special precautions should be taken in building the dam. The

[3] A mashara is equal to a donum (0.25 hectares or 0.617761 acres).

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geologic investigation should extend to the Shiranish limestone, for if this is found to be of adequate quality a higher dam and larger reservoir would be possible.

The construction of an arch dam at this site would be more economical than a gravity dam, but the proper planning and execution of such a dam requires much more skill. The Mission suggests that, after a thorough program of borings have shown the geologic conditions that will be encountered, the design and engineering of the dam should be entrusted to several consulting engineering firms so that the Development Board will be enabled to judge the best of different conceptions. So far as possible, all risks should be eliminated before construction commences. Soundness of conception and safety should not be sacrified in a desire to get things done rapidly.

An arch dam 60 meters in height would provide storage capacity for 1.99 million cubic meters at a level of 501 meters and for 2.21 million at a level of 508 meters. The usable mean discharge of the Lesser Zab would then be raised from about 63 cumecs to 108.5 and 149 cumecs at these respective levels.

The Bekhme Dam on the Greater Zab

The Haigh Commission made a complete geologic reconnaissance, including borings, of the possibilities of building a dam at two different sites in the Bekhme Gorge. It concluded that the Shiranish limestone at the upstream entrance to the gorge would provide a sound foundation for the construction of a high dam. The Commission was primarily interested in this dam as a flood control project, and, after deciding in favor of the Wadi Tharthar scheme, did not therefore include the dam in its program. The Development Board's five-year program also makes no provision for Bekhme.

The Mission urges, however, that construction of the Bekhme dam be undertaken as soon as possible. With the completion of the Dokan dam and related works it is planned to divert the waters of the Lesser Zab into the Adhaim River and use them for irrigating areas on the left bank of the Tigris and in the Diyala River Valley. Thus the Lesser Zab which has a usable flow of about 60 cumecs at present will no longer be supplying water to the Tigris.

7: International Bank N. S-4 (1951) 1952 MH1 Iraq MH1

312 653 As a result irrigation in the Lower Tigris basin, particularly in the area served by the Shatt al Gharraf where water is already acutely short, would inevitably suffer in consequence unless water were made available from some alternative source. Although the deficit may be made good from the Wadi Tharthar in the end, it is by no means certain, as has already been pointed out, that the Wadi Tharthar depression will be able to supply water for irrigation. If the Wadi Tharthar reservoir can ultimately supply the Lower Tigris, it will still be possible to use the water stored behind the Bekhme dam for the irrigation of the Erbil plain in the North.

Nor should the cost be regarded as out of proportion to the results that will be achieved. In 1948 Messrs. Coode, Vaughan-Lee, Frank and Gwyther estimated the cost of a gravity dam in concrete at ID 9,000,000, but in 1950 they came to the conclusion that a buttress dam could be built at considerably lower cost, namely about ID 6,500,000. The dam would provide a net storage capacity of 1.66 billion cubic meters and would increase the usable discharge of the river from 128 cumecs to about 240 cumecs. This would furnish additional water sufficient to irrigate an area of two million masharas gross. On this area it would be possible to grow winter cereals on 828,000 masharas which might have a total value of ID 3,700,000, assuming conservatively a yield of one quarter of a ton per donum and a price of ID 18 per ton. If, in addition, summer crops were grown on one third of the area devoted to winter crops and yielded about the same value per mashara, the total value of the crops grown on the area of two million masharas gross could be put at about ID 5,000,000 per year. The resulting increase in national income would far outweigh the cost of the scheme. Even the tax yield would exceed the cost of amortization.

International Agreements

312 648 The construction of these reservoirs makes it necessary to reach agreements with Syria, Turkey and Iran regarding the control of the waters of the Euphrates and Tigris. For the Euphrates this is particularly urgent because half of the course of the river is in Turkish and Syrian territory and nearly all of its basin is in a foreign country. There are irrigation possibilities in Syria which could seriously reduce the flow of water into Iraq. Works which would raise the water level 10 to 20 meters upstream would com-

7: International Bank N, S-4 (1951) 1952 MH1 Iraq MH1

312 Irrigation projects for the following areas would then be necessary:

1. Along the Lesser Zab the Makhmur area on the right bank (400,000 masharas gross) and the Hawija area on the left bank (300,000 masharas gross). About 180,000 masharas in the Hawija project are already being irrigated, and work is proceeding on the extension of irrigation to the balance. Both areas would be served by canals governed by a new barrage (Hawija barrage) on the Lesser Zab River which would also control the intake into the Adhaim feeder.
2. On the left bank of the Adhaim River a gross area of 600,000 masharas. To raise the water level for the necessary new canals, as well as for the Diyala feeder, construction of a barrage across the Adhaim will be necessary.
3. Extension of the irrigation system of the Diyala by 540,000 masharas gross.
4. Irrigation of a gross area of 660,000 masharas on the left bank of the Tigris below the Diyala River through construction of the Nahrwan canal and of a regulating barrage just above Beni Saad to govern the take-off of the canal from the Diyala.

This program differs from that recommended by the Haigh Commission in that it does not provide for the irrigation (1) of a gross area of 560,000 masharas on the left bank of the Tigris below Fatha, and (2) of a gross area of 300,000 on the right bank of the Adhaim. The agricultural potentialities of these areas have not been surveyed. A decision to provide irrigation for them should accordingly not be made until it is established that their agricultural value is at least equal to that of the other areas.

● [453] In its five-year program the Development Board has already included part of the works for the above projects. This program budgets ID 500,000 for the Hawija barrage on the Lesser Zab, ID 300,000 for the barrage on the Adhaim, ID 500,000 for the Beni Saad dam, ID 750,000 for the construction of part of the new Nahrwan canal and ID 2,600,000 for canal systems in the areas commanded by the Hawija and Adhaim barrages. On the other hand, no provision has yet been made for the Adhaim and Diyala feeders.

The Mission has not attempted to determine which new areas might be irrigated with the additional flow made available upon

TABLE IV

Expenditures of the Directorate General of Irrigation

(in dinars)

Fiscal Year	CAPITAL WORKS BUDGET			ORDINARY BUDGET				TOTAL BUDGET
	Capital Works Other than Bunds	Bunds	Total	Irrigation and Drainage	Flood Control	Salaries Allowances Services	Total	
1941-42	247,396	53,295	300,691	63,986	32,566	75,332	171,884	472,575
1942-43	200,328	119,047	319,375	67,971	36,512	95,128	199,611	518,986
1943-44	355,461	152,830	508,291	82,606	22,842	118,598	224,046	732,337
1944-45	448,309	157,986	606,295	74,963	23,266	154,693	252,922	859,217
1945-46	326,975	124,756	451,731	68,077	28,093	157,981	254,151	705,882
1946-47	667,057	337,897	1,004,954	89,965	125,208	201,527	416,700	1,421,654
1947-48	783,139	363,020	1,146,159	86,628	13,318	187,781	287,727	1,433,886
1948-49	1,088,591	230,671	1,319,262	70,765	54,213	206,146	331,124	1,650,386
1949-50	726,224	159,084	885,308	69,924	32,608	189,418	291,950	1,177,258
1950-51	607,481	173,080	780,561	56,926	19,877	193,868	270,671	1,051,232
Total	5,450,961	1,871,666	7,322,627	731,811	388,503	1,580,472	2,700,786	10,023,413

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2; United Nations U-4 (no date) 1950 M1 Middle East
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489 transport, in other words, a rationally organized goods-tariff service, which so far does not exist.

489 653 Although lacking data on which to base an exact appreciation of the Iraqi Government's plans concerning transport and communications, various sources state that it is making great efforts to improve the means of communication and installations. It supervises the maintenance of the entry to the Shatt al-Arab, and is allocating funds for the purchase of new dredges for the cutting of a new channel. It is reported by authorized sources that the programme for the railways, at the end of 1949, consisted of thirty-five work plans at an estimated total cost of 10,178,000 dinars. New railway lines are being built to serve the economically important districts, as well as railway bridges and a new station and locomotive depot at Baghdad. According to a recent report in the British technical Press, three modern sleeping coaches, with kitchen and air-conditioning, for the Baghdad-Mosul standard-gauge railway (1.435 metres) and beyond, have recently arrived at Basra; two other modern first-class non-air-conditioned coaches are about to arrive.[8] Authorized sources state that the Iraqi Government is arranging for the gradual building (or rebuilding and improvement) of the country's road system, to the extent of its resources. Its main concern is to build new roads across the passes and valleys of the northern plateaux. Hundreds of new bridges for motor traffic have been completed in the last twenty years (including two steel bridges at Baghdad, and one steel bridge, 300 metres long, at Mosul). The

needs of the southern districts are particularly acute: as yet they possess only roads which are not practicable for any traffic, still less for heavy motor traffic, during the rainy season and for a long time afterwards, and boat-bridges of a very old—almost antediluvian—type across the Euphrates and other rivers.

The government is taking steps to modernize the Baghdad and Basra-Ma'agil airports (the latter, in addition to its modern technical installations, has had since 1937 an air-conditioned hotel, swimming pool, tennis courts, etc.). The aim is to make them into first-class international airports. In addition, a training school for civilian air pilots was established in Iraq in 1937.

As the country lacks hydroelectric power stations, in spite of the existence of various large dams, there is now a plan to utilize the Bekhme dam for the generation of electric power.

In the expectation of the return of normal political conditions in the Near and Middle East, the

[8] It is interesting to note that for the Basra—Baghdad section (568 km), these coaches are placed on special 1-metre bogies.

63:Simmons et al G-5 (1941-1951) 1954
M1 Middle East
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312 and controlling the flow of the rivers. By the construction of the Hindiyah dam on the lower Euphrates in 1913, part of its flow was diverted through the Hilla canal and secondary channels, thus opening up over 650,000 acres for irrigation in the western delta. A parallel barrage at Kut, on the Tigris, which was completed in 1939, permitted the forking of the river through abandoned channels and ultimately will bring almost 1 million acres under irrigation. A dam on the Diyala River provides water for the irrigation of about 260,000 acres in that valley. Other projects, designed for flood control, irrigation and sometimes hydroelectric power purposes, are under construction, or planned, for the Great Zab, the Little Zab and other rivers. The enlargement of Habbaniya Lake, west of Baghdad, into a reservoir to control the flooding of the Euphrates and to furnish water for expanded irrigation facilities has been completed recently, while the conversion of the Wadi Tharthar depression, in the Al Jazira region, into a reservoir for the storage of the flood waters of the Tigris was
653 in process of construction in 1952. A Gen-
312 eral Development Board was created by the Iraqi government in 1950 to review its various development programs, including irrigation, communications, medical institutions and other public services. Since its inception, the Board has underwritten extensive projects for the development of domestic water supplies and irrigation.

Waste Disposal

364 There are no municipal sewerage systems in Iraq. In the cities, cesspits are commonly employed for the disposal of sewage, although water-borne systems, connected with septic tanks, are installed in some of the modern homes, hotels and public buildings. The contents of the cesspits are usually carted to dumping grounds on the outskirts of the towns. In the smaller towns and villages, sewage disposal is by means of pit privies or cesspits. However housetops, courtyards and other convenient sites often